Technical Memorandum

SunGuide® Software System

Conops and High-Level Requirements for Software Video Decoder and Viewer Integration into the Operator Map

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DRAFT – Version 3.1

Prepared for:

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List of Acronyms

AE ..... Admin Editor
ATMS ..... Advanced Traffic Management System
AVL ..... Automatic Vehicle Location
CAD ..... Computer Aided Dispatch
C2C ..... Center-to-Center
CCTV ..... Closed-circuit Television
CO ..... Central Office
DMS ..... Dynamic Message Sign
EM ..... Event Manager
FAT ..... Factory Acceptance Test
FDOT ..... Florida Department of Transportation
FHP ..... Florida Highway Patrol
FL-ATIS ..... Florida Advanced Traveler Information System
GUI ..... Graphical User Interface
IM ..... Incident Management
ITS ..... Intelligent Transportation Systems
IV&V ..... Independent Verification and Validation
MDX ..... Miami-Dade Expressway Authority
MTBF ..... Mean Time Between Failure
ODS ..... Operational Data Store
PTZ ..... Pan/Tilt/Zoom
QA/QC ..... Quality Assurance/Quality Control
RR ..... Road Ranger
RTVM ..... Requirements Traceability Verification Matrix
STMCSLS ..... Statewide Transportation Management Center Software Library System
SwRI ..... Southwest Research Institute
SVG ..... Scalable Vector Graphics
TERL ..... Traffic Engineering Research Laboratory
TMC ..... Transportation Management Center
TSS ..... Traffic Sensor Subsystem
TvT ..... Travel Time
TxDOT ..... Texas Department of Transportation
VLC ..... VideoLAN Client
VSL ..... Variable Speed Limit
XML ..... eXtensible Markup Language

1. Scope

This section provides the concept of operations and the high level requirements for a software video decoder and viewer integration into the SunGuide Operator Map.

2. Purpose

One goal of this document is to capture the desired enhancements conops and details for stakeholder review and stakeholder consensus. Another goal of this document is to clearly define the enhancement to support the development of the requirements and a cost estimate for the design and build of the enhancement.

3. References

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this document, this document shall be considered the superseding requirement.

Standard Written Agreement Modification
Contract BDQ69
June 25, 2010

Florida Department of Transportation
Traffic Engineering and Operations Office
605 Suwannee Street, M.S. 90
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Letter of Authorization #3,
FDOT Contract BDQ69
August 16, 2010

Florida Department of Transportation
Traffic Engineering and Operations Office
605 Suwannee Street, M.S. 90
Tallahassee, Florida 32399-0450
(850) 410-5600

4. Overview and Benefits

The SunGuide system currently uses shared displays for displaying video. The CCTV, Video Switching, and Video Wall subsystems work together to allow the operators to switch and view video on the video wall with built-in and integrated video decoders or on a set of monitors that are connected to external video decoding appliances. The missing video viewing capability is to have the video shown right on the desktop of the operator workstation from a fully integrated SunGuide user-interface. Currently, an off-the-shelf software decoder could be installed on the workstation. However, without this proposed integration into the Operator Map, a separate list of camera names and multicast addresses must be maintained in a separate software application database, in a look-up table, or memorized; also, the decoder must be launched and controlled independently from SunGuide. Integration of this component into the SunGuide GUI will reduce the configuration, maintenance, and run-time operational effort required for the capability of displaying video on the user's workstation of a selected camera on the operator map.

Also, there would be two optional related enhancements of having a system-wide configurable maximum number of simultaneous open video dialogs per operator or workstation as well as an optional related enhancement of displaying the most recent snapshot of the CCTV when the operator hovers over a CCTV icon.

5. Primary Enhancement: Video Dialog

The desired usage of this enhancement would be for the operator, while using the operator map or the CCTV status dialog, to be able to easily launch a pop-up, resizable video viewer of the desired camera with no additional configuration.

The cameras all have icons that should have a right-click (or context) menu that would contain a clickable menu item called "Launch Video". Clicking this menu item would be one way to launch the video viewer in a separate pop-up

The CCTV status dialog is another context appropriate place to be able to launch the video. This dialog would have a button called "Launch Video" that would have the same effect as the above menu item.

When launched, the dialog would be a basic window. It would have the CCTV name in the title of the window. It would have no menus, just the standard Windows title-bar functionality primarily to close the dialog. The video would fill the window area. The window would allow resizing, but would maintain the aspect ratio of the video, such that the video always filled the windows on both dimensions.

This dialog would have a context menu if the operator right-clicks anywhere on the video. The context menu would have two items: "Close", which would close the window, and "PTZ" which would launch the CCTV status dialog if it was not already launched. Also, regardless if the PTZ was just launched or was already launched, the PTZ action would also bring the CCTV status dialog into focus with the appropriate CCTV camera selected.

If the operator double-clicks on the video, this would have the same effect as clicking "PTZ" from the context menu as discussed above.

The nuts and bolts of decoding video will be handled by a component that SunGuide would not have to redevelop. SunGuide would "wrap and control" this component. This component is described in the next section.

6. Video Decoding Component

VideoLAN Client (VLC) media player is a free and open-source cross-platform multimedia player and framework that will be used by SunGuide to display the encoded video. More information about this component can be found on their website, http://www.videolan.org/vlc/; however, the highlights are mentioned below.

This is a software video decoder has a user interface that displays the decoded video in a dialog, a network interface that uses the workstations networking components to request and receive the encoded video into the application, and an ActiveX programming interface that can be used by SunGuide to include as a component to a SunGuide dialog. Each instance of the SunGuide video dialog will include the VLC as an ActiveX control, use functions and properties to instruct VLC as to which network address to retrieve the video and to resize the video window.

The VLC website lists support for the following Input media, Input formats, and Video Formats:

Input Media	**Input Formats**	**Video Formats**
UDP/RTP Unicast	MPEG (ES,PS,TS,PVA,MP3)	MPEG-1/2
UDP/RTP Multicast	AVI	DIVX (1/2/3)
HTTP / FTP	ASF / WMV / WMA	MPEG-4 ASP, DivX 4/5/6, XviD, 3ivX D4
MMS	MP4 / MOV / 3GP	H.261
TCP/RTP Unicast	OGG / OGM / Annodex	H.263 / H.263i
DCCP/RTP Unicast	Matroska (MKV)	H.264 / MPEG-4 AVC
File	Real	Cinepak
DVD Video 1	WAV (including DTS)	Theora
Video CD / VCD	Raw Audio: DTS, AAC, AC3/A52	Dirac / VC-2
SVCD 2	Raw DV	MJPEG (A/B)
Audio CD (no DTS-CD)	FLAC	WMV 1/2
DVB (Satellite, Digital TV)	FLV (Flash)	WMV 3 / WMV-9 / VC-1 1, 2 1 1, 2 1 1
MPEG encoder 4	MXF	Sorenson 1/3 (Quicktime)
Video acquisition	Nut	DV (Digital Video)
	Standard MIDI / SMF	On2 VP3/VP5/VP6
	Creative™ Voice	Indeo Video v3 (IV32)
		Indeo Video 4/5 (IV41, IV51)
		Real Video 1/2
		Real Video 3/4

This VLC software component is free and open source; thus, it does not have any formal support; however, it has a large user base in a large variety of environments. Also, it has been in use at TERL, District 2, District 6, and likely other districts for displaying video from the same encoded video streams as used in SunGuide successfully.

6.1. Option 1: Configurable Maximum Allowed Simultaneous Streams

There would be a system-wide configuration value to limit the maximum number of simultaneous open video streams. If the user attempted to launch more than the maximum allowed streams, a simple error message box would mention how many simultaneous open streams are allowed and kindly ask the operator to close other video streams before launching additional video streams. It would be desirable for the Department to receive a separate line item in the cost estimate to include this feature or not to include this feature separate from the primary task of the launch video stream dialog.

6.2. Option 2: Local Tours

Another use of this SunGuide GUI VLC wrapper window is to not only display a single camera, but also to display a tour. There will need to be a concept further developed as to how the GUI will present the operator with the ability to launch a particular tour. The concept currently defined for a camera does not involve the video switching dialog, but this dialog is the only place that a list of video tours is currently available. Also, consideration should be made on how the dialog currently works. Currently, it uses a drag and drop mechanism that is implemented as a single click on the source and a single click on a destination. It is possible that a special area that represents a local dialog could be put in the dialog as a place to drop a tour such that the VLC window would launch with the tour running. If so, it would also be natural for the user to expect the camera sources to also work that way and thus, individual camera sources may need to support this additional switching GUI mechanism.

7. Cost Estimate and Schedule

	Cost Estimate
Base functionality:	$23,000
Option 1 - Limit Open Streams	$7,000
Option 2 – Local Tours	

SwRI anticipates this enhancement can be completed within a 2-3 month time period.